

Spacewalk Delay for Ammonia Leak
August 7, 2010
International Space Station

Astronauts at the International Space Station ran into problems during a planned replacement of a broken ammonia cooling pump on August 7, 2010. In order to replace the pump, four ammonia hoses and five electrical cables needed to be disconnected to remove the broken pump. One of the hoses could not be removed because of a jammed fitting. When an astronaut was able to disconnect it by hitting the fitting with a hammer, it caused an ammonia leak.

Outline

Define the Problem

What

Problem(s)

Failed cooling pump, extended spacewalk, loss of redundant system, ammonia leak

When

Date

August 7, 2010

Time

0719 EDT (mission began)

Where

Facility, site

Jammed fitting

Unit, area, equipment

International Space Station

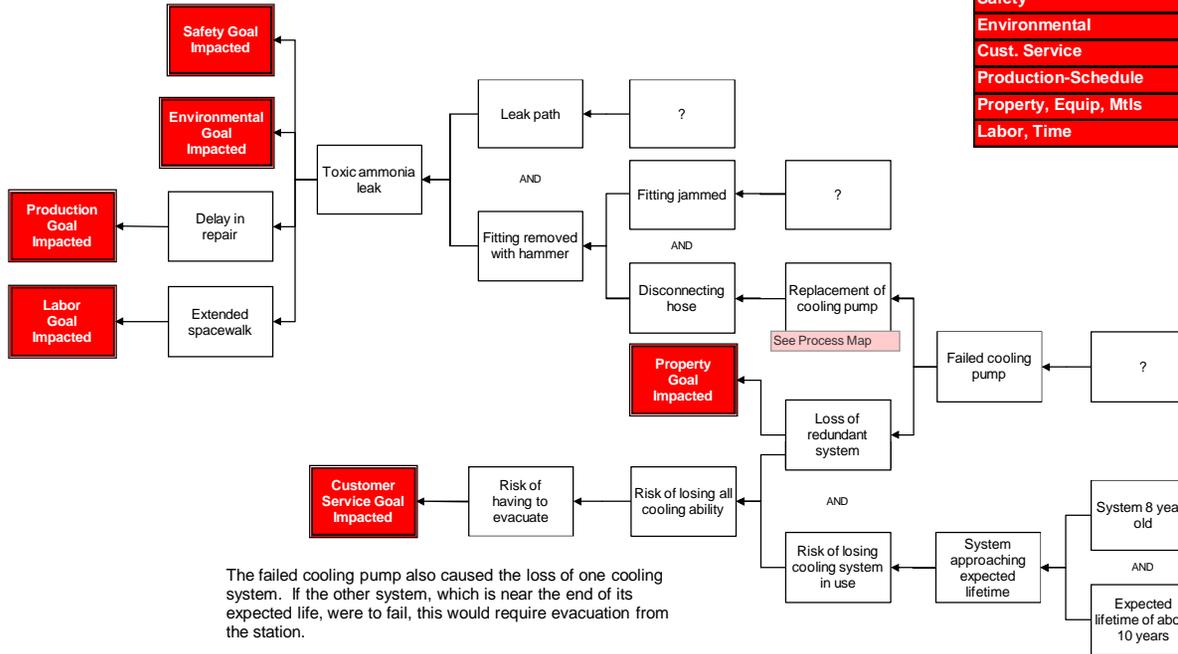
Task being performed

One of two cooling systems

Removing broken ammonia coolant pump

Cause Map

Detail Level



Impact to the Goals

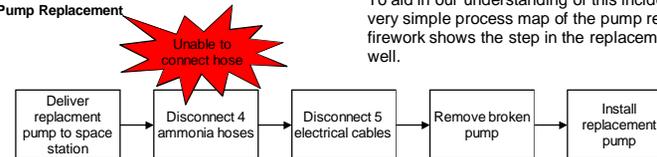
Safety	Toxic ammonia leak
Environmental	Toxic ammonia leak
Cust. Service	Risk of having to evacuate space station
Production-Schedule	Delay in repair
Property, Equip, Mtls	Loss of redundant system
Labor, Time	Extended spacewalk

Ammonia is toxic, so the leak impacted both the safety and environmental goals. Because the broken pump kept one cooling system from working, there was a risk of having to evacuate the space station, should the other system (which was the same age) fail. This can be considered an impact to the customer service goal. The repair had to be delayed, which is an impact to the production/schedule goal. The loss of a redundant system is an impact to the property/equipment goal. The extended spacewalk is an impact to the labor/time goal.

Once we fill out the outline with the impact to the goals and information regarding the problem, we can go on to the Cause Map. The ammonia leak was caused by an unknown leak path and the fitting being removed by a hammer. The fitting was removed with a hammer because it was jammed and had to be disconnected in order for the broken pump to be replaced. As we're not aware of what caused the pump to break (this information will likely be discovered now that the pump has been removed), we leave a question mark on the map, to fill in later. above.

Process Map

Ammonia Cooling Pump Replacement



To aid in our understanding of this incident, we can create a very simple process map of the pump replacement. The red firework shows the step in the replacement that didn't go well.



Copyright ThinkReliability 2009

